Name _____

Compare Fractions and Decimals

Essential Question How can you compare decimals, fractions, and mixed numbers on a number line?

Unlock the Problem (Real World)

The Tech Club compared the weights of three cell phones. Estéban's phone weighed 4.7 ounces. Jill's phone weighed $4\frac{3}{5}$ ounces. Mona's phone weighed 4.35 ounces. Who has the phone with the lightest weight?

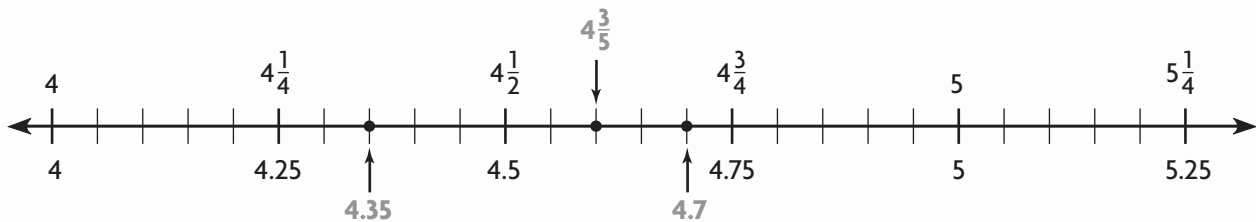You can use a number line to compare fractions and decimals.

Remember: Greater values on a number line lie farther to the right.

- How can you identify the number with the least value?

  _____

  _____

  _____

  _____

Compare the values on a number line.

STEP 1 Locate some benchmarks.

- Benchmark decimals: 4, 4.25, 4.5, 4.75, 5…
- Benchmark mixed numbers: 4, $4\frac{1}{4}$, $4\frac{1}{2}$, $4\frac{3}{4}$, 5…

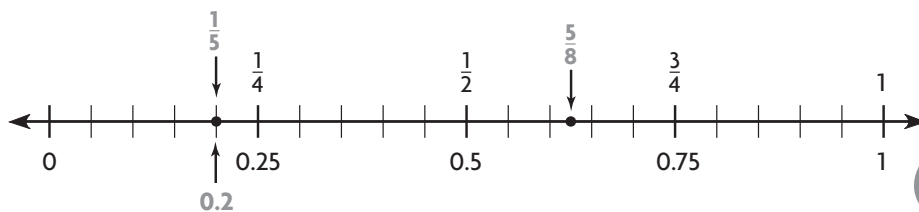**STEP 2** Mark the weight of each cell phone on the number line.

- Find the location of 4.7, $4\frac{3}{5}$, and 4.35.

  Since $4.35 < 4\frac{3}{5} < 4.7$, Mona's phone is lightest.

Try This! Compare $\frac{1}{5}$, $\frac{5}{8}$, and 0.2. Which number has the greatest value?

- Mark each value on a number line.

The greatest number is _____. **Explain** how you decided.

Math Talk **Mathematical Practices**

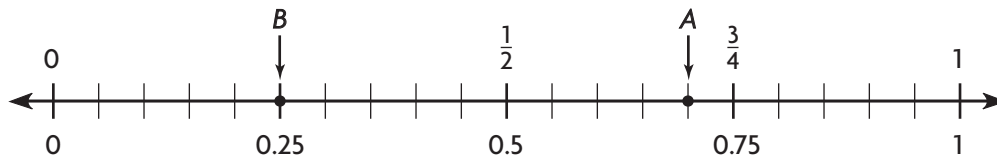**Explain** how you can tell that $\frac{1}{5}$ and 0.2 are equal.

For 1–2, identify the points on the number line.
Then write the greater number.

1. point *A* as a decimal

_____

2. point *B* as a fraction

B · · · · · · · · · · · A · · · · · · · · · · · · ·
0 .... $\frac{1}{2}$ .... $\frac{3}{4}$ 1
0 ...... 0.25 ...... 0.5 ...... 0.75 1

_____   _____ is greater.

Locate each number on a number line.
Then complete the sentence.

3. 0.55, $\frac{2}{5}$, 0.46

The number with the greatest value is _____ .

On Your Own

Locate each number on a number line. Then complete the sentence.

4. 0.4, $\frac{3}{4}$, 0.15

The number with the greatest value is _____ .

5. $2\frac{2}{3}$, 2.45, $2\frac{2}{5}$

The number with the least value is _____ .

6   3.95, $3\frac{5}{6}$, $3\frac{4}{5}$

The number with the greatest value is _____ .

Problem Solving Real World

7. Hannah made 0.7 of her free throws in a basketball game. Abra made $\frac{9}{10}$ of her free throws. Dena made $\frac{3}{4}$ of her free throws. Who was the best shooter? **Explain.**

_____

_____

Name _____

Order Fractions and Decimals

Essential Question How can you order decimals, fractions, and mixed numbers on a number line?

🔑 Unlock the Problem (Real World)

In tennis, Jocelyn's serve takes 0.97 of a second to reach her opponent. Dave's serve takes $\frac{4}{5}$ of a second. Monica's serve takes 0.85 of a second. Order the three serves from shortest to longest time.

🗝 **Order the fractions and decimals on the number line.**

STEP 1 Locate the benchmarks on the number line.

- Benchmark decimals: 0, 0.25, 0.5, 0.75, 1.
- Benchmark fractions: 0, $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, 1.

- You want to order the times from shortest to longest. Should you read the numbers on the number line left to right or right to left?

_____

_____

_____
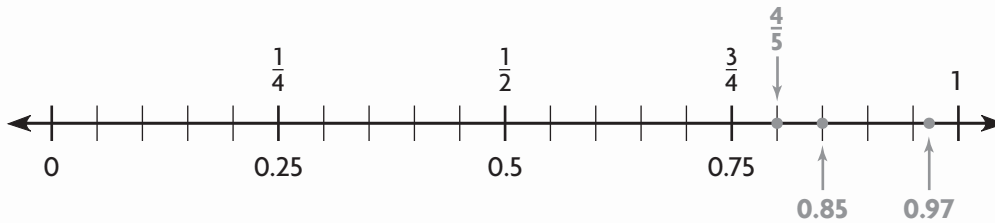
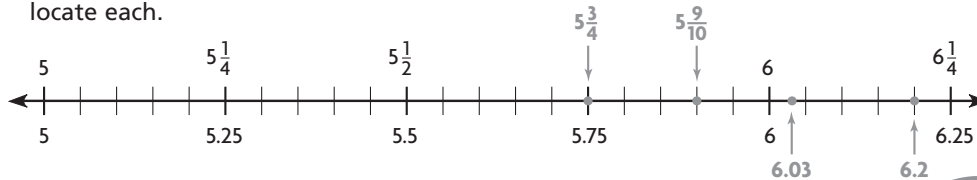**STEP 2** Locate 0.97, $\frac{4}{5}$, and 0.85 on the number line.

STEP 3 Order the fractions and decimals.

Remember: The point farthest to the left is the least value.

So, the times in order from shortest to longest are: __$\frac{4}{5}$__ , __0.85__ , __0.97__ .

Try This! Order 6.03, $5\frac{9}{10}$, $5\frac{3}{4}$, and 6.2 from greatest to least.

- Locate each fraction and decimal on the number line. Use benchmarks to help you locate each.

From the greatest to least: _____, _____, _____, _____
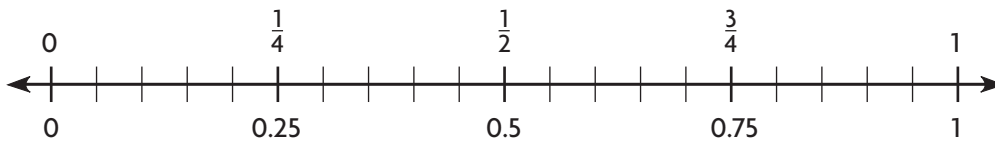
Math Talk | **Mathematical Practices**

How does the number line help you order numbers from greatest to least?

Share and Show

MATH BOARD

Locate each number on the number line.

Then write the numbers in order from least to greatest.

Number line with top labels: 0, $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, 1 and bottom labels: 0, 0.25, 0.5, 0.75, 1

1. $\frac{3}{5}$, 0.54, 0.35

_____

For 2–3, locate each set of numbers on a number line.

Then write the numbers in order from greatest to least.

2. 1.16, $1\frac{1}{4}$, 1.37, $1\frac{1}{10}$

3. $\frac{5}{8}$, 0.5, $\frac{2}{5}$, 0.78

_____   _____

On Your Own

For 4–5, locate each number on a number line.

Then write the numbers in order from least to greatest.

4. 0.6, $\frac{1}{2}$, $\frac{2}{3}$, 0.39

5. $7\frac{1}{4}$, 7.4, $7\frac{3}{4}$, 7.77

_____   _____

For 6–7, locate each number on a number line.

Then write the numbers in order from greatest to least.

6. $\frac{3}{10}$, 0.222, $\frac{3}{5}$, 0.53

7. 2.96, $3\frac{1}{5}$, 3.48, $3\frac{1}{4}$

_____   _____

Problem Solving · Real World

8. Judges in a skateboarding competition gave scores of 8.2, $8\frac{1}{3}$, $8\frac{4}{5}$, 8.44, and $8\frac{1}{5}$. Which two scores were closest to one another? **Explain**.

_____

_____

Name _____

Factor Trees

Essential Question How can you factor numbers using a factor tree?

Unlock the Problem — Real World
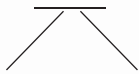
Mr. Shu gives this puzzle to his math students.

"Write 24 as a product of factors that are prime. Remember that a prime number must be greater than 1 and can have only 1 and itself as factors."

You can use a diagram called a **factor tree** to find the factors of a number.

- Give an example of a number greater than 1 that has only 1 and itself as factors.

  _____

🔑 **Use a factor tree to find the prime number factors that have a product of 24.**

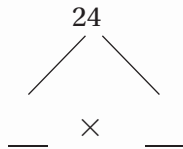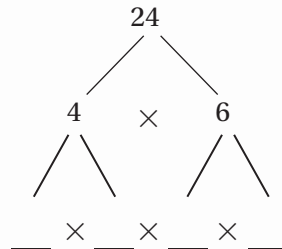| STEP 1	STEP 2	STEP 3	STEP 4
Write the number to be factored at the top of the factor tree.	Write it as a product of any two factors. **Think:** $4 \times 6 = 24$	Write each factor as the product of two factors. **Think:** $2 \times 2 = 4$ and $2 \times 3 = 6$	Continue until each factor is a prime number. **Think:** $2 \times 1 = 2$ and $3 \times 1 = 3$ Write the factors that are prime numbers from least to greatest.

So, 24 = _____ .

Try This! **Make a different factor tree for 24.**

- Is the product of factors the same as in the Example? **Explain.**

  _____

  _____

  _____

24

×
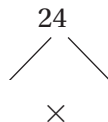
Math Talk — Mathematical Practices
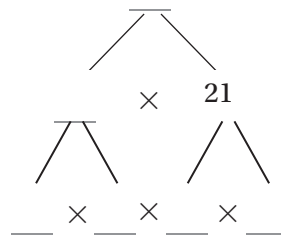
Explain how you can use factored numbers to find common factors.

1. Use a factor tree to find the prime number factors that have a product of 210.

- Write 210 as a product of any two factors.

  _____ = _____ × 21

- Write each factor as the product of factors.

  10 = _____ × _____   21 = _____ × _____

Now each factor has only _____ and itself as factors.

So, 210 = _____ × _____ × _____ × _____.
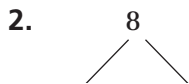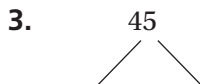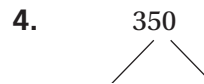
⚠ **ERROR Alert**

Remember to continue to factor a number if it has factors other than 1 and itself.

Use a factor tree to find the prime number factors.

2.   8

3.   45

4.   350

Use a factor tree to find the prime number factors.

5.   36

6.   72

7.   540

Mr. Shu gave these problems to his math students. Solve.

8. Write 500 as a product of prime number factors. Each factor must be greater than 1 and can have only 1 and itself as factors.

9. Find a number that has four identical even factors. Each factor must be greater than 1 and can have only 1 and itself as factors.

Name _____

Model Percent

Essential Question How can you express real world quantities as percents and use them to solve problems?

🔑 Unlock the Problem (Real World)

Percent means "per hundred" or "out of 100." So, when you find percent you are finding a part of 100. Sixty percent, for example, means 60 out of 100. You can write percents using the percent symbol, %. So, 60 percent is written as 60%.

• What number is always compared in a percent?

_____

🔑 Example 1 Name the percent that is shaded.

• 5 columns: 5 × 10 = 50.

• 3 squares: 3 × 1 = 3

• Total: 50 + 3 = 53 out of 100, or 53 percent is shaded.
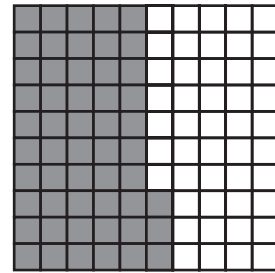
🔑 Example 2 Name the percent that is not shaded.

• 4 columns: 4 × 10 = 40.

• 7 squares: 7 × 1 = 7

• Total: 40 + 7 = 47 out of 100, or 47 percent is not shaded.

Try This! Use the number line. Tell what these percents mean: 0 percent, 50 percent, 100 percent.

$\frac{0}{100}$ $\frac{50}{100}$ $\frac{100}{100}$

0%   25%   50%   75%   100%
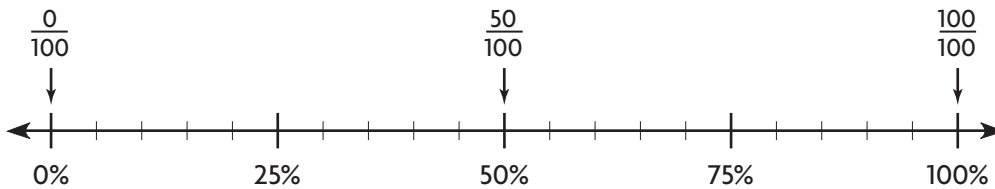
A. 0 percent means _____ out of 100, or none of the total.

B. 50 percent means _____ out of 100, or half of the total.

C. 100 percent means _____ out of 100, or all of the total.

Math Talk **Mathematical Practices**

Which benchmark is 33% closest to? **Explain** how you know.

Use the diagram to write the percent.

1. How many whole columns and single squares are shaded?

   _____
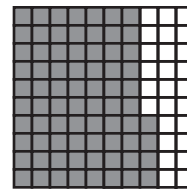
2. What percent is shaded?

   _____

3. What percent is unshaded?

   _____

Shade the grid to show the percent.

4. 20 percent
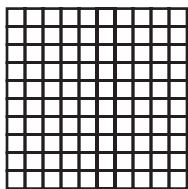
5. 86 percent
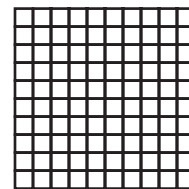
On Your Own

Use the diagram to write the percent.

6. light shading

   _____

7. dark shading

   _____

8. not shaded

   _____
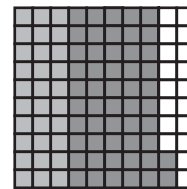
9. not shaded

   _____

10. dark shading

    _____

11. light shading

    _____
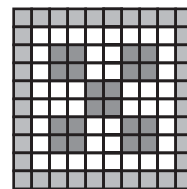
Write the closest benchmark for the percent.

12. 48%

    _____

13. 94%

    _____

14. 4%

    _____

Problem Solving Real World

15. In an election between Warren and Jorge, Warren declared victory because he received 58 percent of the vote. Is he correct? **Explain**.

    _____

    _____

Name _____

Relate Decimals and Percents

Essential Question How can you express decimals as percents and percents as decimals?

🔑 Unlock the Problem (Real World)

Decimals and percents are two ways of expressing the same number. You can write a percent as a decimal. You can also write a decimal as a percent.

- In percent, the "whole" is 100. What is the "whole" in decimal form?

_____

🔑 Example 1   Model 0.42. Write 0.42 as a percent.

STEP 1   Write the decimal as a ratio.

0.42 = 42 hundredths = 42 out of 100.

STEP 2   Make a model that shows 42 out of 100.

STEP 3   Use the model to write a percent.

42 shaded squares = __42__ percent, or __42__%
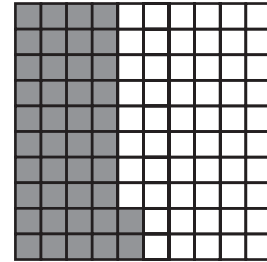
🔑 Example 2   Model 19 percent. Write 19% as a decimal.

STEP 1   Write the percent as a fraction.

$19\% = \frac{19}{100}$

STEP 2   Make a model that shows 19 out of 100.

STEP 3   Use the model to write a decimal.

19 shaded squares out of 100 squares = _____
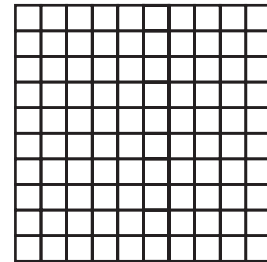
Math Talk   **Mathematical Practices**

Suppose a store is having a 50% off sale. What does this mean?

MATH
BOARD
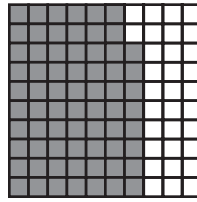
Use the model. Complete each statement.

1a. $0.68 = $ _____ out of 100

1b. How many squares are shaded?

_____

1c. What percent is shaded?

_____

Write the percents as decimals.

2. 47 percent

_____

3. 11 percent

_____

On Your Own

Write the decimals as percents.

4. 0.20

_____

5. 0.39

_____

6. 0.44

_____

7. 0.93

_____

8. 0.07

_____

9. 0.7

_____

10. 0.06

_____

11. 0.6

_____

Write the percents as decimals.

12. 12 percent

_____

13. 31%

_____

14. 99 percent

_____

15. 13 percent

_____

16. 4 percent

_____

17. 14 percent

_____

18. 90 percent

_____

19. 9%

_____

Problem Solving Real World

20. In basketball, Linda made 0.56 of her shots. What percent of her shots did Linda miss?

_____

Name _____

Fractions, Decimals, and Percents

Essential Question How can you convert between fractions, decimals, and percents?

⚷ Unlock the Problem (Real World)

Every percent and decimal number can also be written as a fraction. All fractions can be written as decimals and percents. For example, $\frac{2}{5}$ of the songs in Bonnie's music collection are country songs. What percent of her song collection is country?

Write the percent that is equivalent to $\frac{2}{5}$.

STEP 1   Set up the equivalent fraction with a denominator of 100.

$$\frac{2 \times ?}{5 \times ?} = \frac{}{100}$$

STEP 2   Ask: By what factor can you multiply the denominator to get 100?

$$\frac{2 \times ?}{5 \times 20} = \frac{}{100} \longleftarrow \text{multiply the denominator by 20}$$

STEP 3   Multiply the numerator by the same factor, 20.

$$\frac{2 \times 20}{5 \times 20} = \frac{40}{100}$$

STEP 4   Write the fraction as a percent.

$$\frac{40}{100} = \underline{40} \text{ percent}$$

So, $\frac{2}{5}$ equals $\underline{40}$ percent.

🔑 More Examples

A. Write $\frac{8}{25}$ as a decimal.

STEP 1   Write an equivalent fraction with a denominator of 100.

$$\frac{8 \times 4}{25 \times 4} = \frac{32}{100} \longleftarrow \text{multiply denominator and}$$
$$\text{numerator by 4}$$

STEP 2   Write the fraction as a decimal.

$$\frac{32}{100} = 0.32$$

B. Write 90 percent as a fraction in simplest form.

STEP 1   Write 90% as a fraction.

$$90\% = \frac{90}{100}$$

STEP 2   Simplify.

$$90\% = \frac{90 \div 10}{100 \div 10} = \frac{9}{10}$$

Math Talk **Mathematical Practices**

How are 9% and 90% alike when written as decimals? How are they different?

MATH
BOARD

Complete the steps to write $\frac{7}{20}$ as a percent.

1. By what factor should you multiply the

   denominator and numerator? _____

   $$\frac{7 \times ?}{20 \times ?} = \frac{?}{100}$$

2. For $\frac{7}{20}$, what is an equivalent fraction with a
   denominator of 100?

3. What percent is equivalent to $\frac{7}{20}$?

_____   _____

Write a decimal, a percent, or a simplified fraction.

4. $\frac{1}{4}$ as a decimal

5. $\frac{3}{10}$ as a percent

6. 80% as a fraction

_____   _____   _____

Write a decimal, a percent, or a simplified fraction.

7. $\frac{1}{2}$ as a percent

8. $\frac{9}{10}$ as a decimal

9. $\frac{11}{20}$ as a percent

10. 75% as a fraction

_____   _____   _____   _____

11. $\frac{3}{5}$ as a percent

12. $\frac{9}{25}$ as a decimal

13. $\frac{29}{50}$ as a percent

14. $\frac{1}{20}$ as a percent

_____   _____   _____   _____

15. 4% as fraction

16. $\frac{4}{5}$ as a percent

17. $\frac{24}{25}$ as a decimal

18. $\frac{41}{50}$ as a percent

_____   _____   _____   _____

Problem Solving Real World

19. Whitney has finished $\frac{9}{20}$ of her book. What
    percent of the book does Whitney still need
    to read?

20. Roger has completed $\frac{4}{25}$ of his math homework.
    What percent of his math homework does he still
    need to do?

_____   _____

Name _____

✓ Checkpoint

Concepts and Skills

Locate each number on the number line. Then complete the sentence.

1. $0.4, \frac{3}{5}, 0.35$
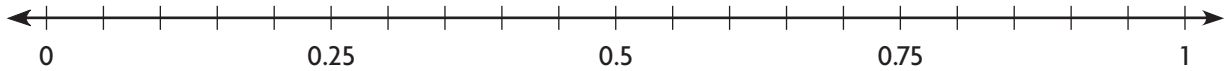
The number with the least value is _____.

Write the numbers in order from least to greatest.

2. $0.4, \frac{3}{5}, 0.55, \frac{1}{4}$

3. $\frac{3}{4}, 0.7, \frac{1}{2}, 0.1$

_____ _____

Use a factor tree to find the prime number factors.

4. 16

5. 36

6. 42

_____ _____ _____

Write a decimal, a percent, or a simplified fraction.

7. 0.08 as a percent

8. $\frac{3}{5}$ as a decimal

9. 80% as a fraction

10. $\frac{13}{20}$ as a percent

_____ _____ _____ _____

Problem Solving (Real World)

For 11–12, use the data in the table.

11. What percent of the apes in the Wild Country Zoo are orangutans?

_____

12. One species makes up 40% of the apes in the zoo. Which species is it?

_____

Apes in the Wild Country Zoo	
Species	**Number**
Bonobo	4
Chimpanzee	20
Gorilla	15
Orangutan	11
Total	**50**

Fill in the bubble or grid completely to show your answer.

13. Entries for the Lake Manatee Bass Fishing Contest are shown. First place is awarded to the contestant with the heaviest fish.

Lake Manatee Bass Contest	
Contestant	**Weight of fish caught**
George	6.25 pounds
Mia	$6\frac{2}{5}$ pounds
Harvey	$6\frac{1}{3}$ pounds

What is the correct order from first place to third place?

Ⓐ First: George, Second: Mia, Third: Harvey

Ⓑ First: Mia, Second: George, Third: Harvey

Ⓒ First: Mia, Second: Harvey, Third: George

Ⓓ First: Harvey, Second: Mia, Third: George

14. Ric used a factor tree to write 180 as a product of factors that are prime numbers. How many factors were in Ric's product?

Ⓐ 2

Ⓑ 3

Ⓒ 4

Ⓓ 5

15. On Monday, 6% of the students at Riverside School were absent. Written as a decimal, what portion of Riverside's students attended school that day?

Ⓐ 0.06

Ⓑ 0.6

Ⓒ 0.94

Ⓓ 9

16. The Hastings family drove $\frac{12}{25}$ of the distance to Yellowstone National Park on the first day of their vacation. What percent of the distance to the park remained for them to drive?

Ⓐ 12%   Ⓒ 48%

Ⓑ 13%   Ⓓ 52%

Divide Fractions by a Whole Number

Essential Question How do you divide a fraction by a whole number?

Unlock the Problem (Real World)

Four friends share $\frac{2}{3}$ of a quart of ice cream equally. What fraction of a quart of ice cream does each friend get?

- What operation will you use to solve the problem?

  _____

🔑 **Divide.** $\frac{2}{3} \div 4$

STEP 1

Let the rectangle represent 1 quart of ice cream. Divide it into thirds by drawing vertical lines. Shade 2 of the thirds.

STEP 2

Divide the rectangle into fourths by drawing horizontal lines. Shade $\frac{1}{4}$ of the $\frac{2}{3}$ already shaded.

STEP 3

The rectangle is now divided into _____ equal parts.

Each part is _____ of the rectangle. Of the 12 equal parts, _____ parts are shaded twice. So,

_____ of the rectangle is shaded twice.
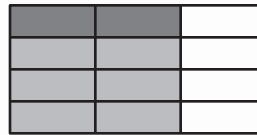
So, each friend gets _____ of a quart of ice cream.

Math Talk **Mathematical Practices**

Explain why you divided the rectangle into fourths in Step 2.

Try This! **Divide.** $\frac{3}{4} \div 2$

STEP 1

Divide the rectangle into fourths. Shade 3 of the fourths.

STEP 2

Divide the rectangle into halves. Shade $\frac{1}{2}$ of the $\frac{3}{4}$ already shaded.

STEP 3

Of the 8 equal parts, _____ parts are shaded twice. So, _____ of the rectangle is shaded twice.

So, $\frac{3}{4} \div 2 =$ _____.

Complete the model to find the quotient. Write the quotient in simplest form.

1. $\frac{5}{6} \div 2 =$ _____

Divide the rectangle into sixths.
Shade 5 of the sixths.
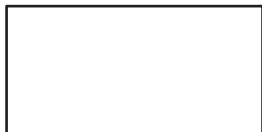
Divide the rectangle
into halves. Shade
$\frac{1}{2}$ of $\frac{5}{6}$.

2. $\frac{3}{4} \div 3 =$ _____

3. $\frac{2}{3} \div 3 =$ _____
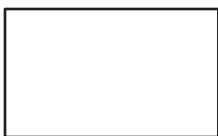
4. $\frac{3}{5} \div 2 =$ _____

On Your Own

Complete the model to find the quotient. Write the quotient in simplest form.

5. $\frac{2}{5} \div 2 =$ _____

6. $\frac{5}{8} \div 3 =$ _____

Draw a model to find the quotient. Write the quotient in simplest form.

7. $\frac{4}{9} \div 2 =$ _____

8. $\frac{4}{5} \div 3 =$ _____

Problem Solving Real World

9. Heather, Jocelyn, and Dane are each swimming one leg of a $\frac{9}{10}$ mile
race. They will divide the distance equally. How far will each team
member swim?

_____

Name _____

Ratios

Essential Question How can you express real world quantities as ratios?

🔑 Unlock the Problem (Real World)

Max sells bouquets of roses. There are 3 yellow roses and 2 red roses. What is the ratio of yellow to red roses?

A ratio is a comparison of two numbers.

- A ratio is expressed by comparing one part to another, such as 4 feet to 20 toes, or 3 yellow roses to

  _____ .

🔑 Activity Materials ■ two-color counters

Model the data.

STEP 1 Use 3 counters with the yellow side up to represent yellow roses and 2 counters with the red side up to represent red roses.

_____
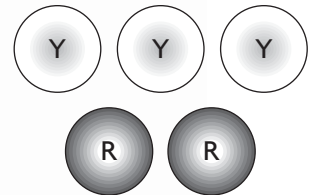
STEP 2 Write the ratio of yellow to red roses.

- Ratios can be written in different ways.

  3 to 2   or   3:2   or $\frac{3}{2}$ (as a fraction)

So, the ratio of yellow roses to red roses is __**3 to 2**__ , __**3:2**__ , or __$\frac{3}{2}$__ .

In the example above, you compared a part to a part. You can also use a ratio to compare a part to a whole or a whole to a part.

Try This! **Show a ratio of red counters to total counters.**

STEP 1 Count to find the number of red counters. _____

_____

STEP 2 Count to find the total number of counters. _____

_____

STEP 3 Write the ratio. _____
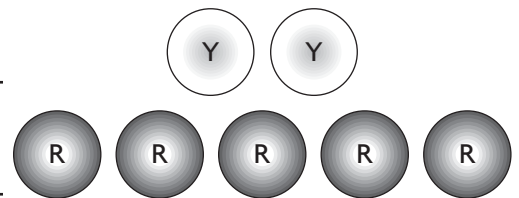
Math Talk Mathematical Practices

How would the ratio change if you found the ratio of total counters to red counters?

Share and Show

MATH BOARD

Find the ratio of red counters to yellow counters.

1a. How many red counters are there?

R R Y R R Y Y

_____

1b. How many yellow counters are there?

_____

1c. What is the ratio of red to yellow counters?

_____

Write the ratio.

2. squares to circles

_____
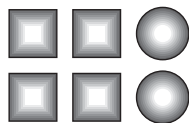
3. total squares to dark squares

_____
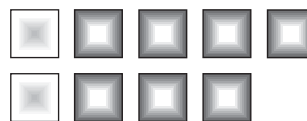
On Your Own

For 4–6, use the drawing to write the ratio.

4. dark to light

_____

5. light to dark

_____

6. light to total

_____
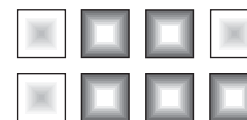
For 7–9, use the drawing to write the ratio.

7. triangles to circles

_____

8. dark to light

_____

9. total shapes to circles

_____
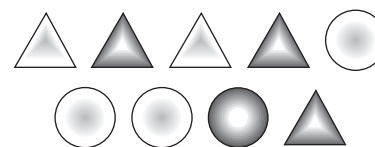
For 10–12, write the ratio.

10. weekdays to weekend days

_____

11. weekend days to days in a week

_____

12. days in a week to days in January

_____

Problem Solving Real World

13. The ratio of length to width in Gus's driveway is 13 yards to 4 yards. What is this ratio in feet? (Hint: 3 ft = 1 yd)

_____

Equivalent Ratios

Essential Question How can you determine if two ratios are equivalent?

🔑 Unlock the Problem (Real World)

To make brass, you can mix 2 parts zinc to 3 parts copper, a ratio of 2 to 3. If you have 12 bars of copper and use them all, how many bars of zinc do you need to make brass?

Since ratios can be written as fractions, 2 to 3 can be written as $\frac{2}{3}$. Use what you know about equivalent fractions to find equivalent ratios.

- You know that each group of zinc to copper bars needed to make brass has a ratio of 2 to 3. How can you use this group to find an equivalent ratio?

🔒 Use a diagram to find an equivalent ratio.

zinc

copper

STEP 1 Draw bars to represent a 2 to 3 ratio of zinc to copper.

STEP 2 Add groups until you have 12 bars of copper.

zinc

copper
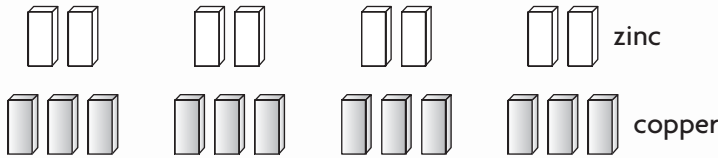
STEP 3 Count the zinc bars. Write an equivalent ratio.

There are 8 zinc bars. So, 2 to 3 is equivalent to the ratio 8 to 12.

Try This! **Use equivalent ratios to find out if 6:8 is equivalent to 18:24.**

STEP 1 Write the ratios as fractions.

$$6{:}8 = \frac{6}{8} \qquad 18{:}24 = \frac{18}{24}$$

STEP 2 Write the fractions in simplest form. Then compare.

$$\frac{6 \div 2}{8 \div 2} = \frac{3}{4} \qquad \frac{18 \div 6}{24 \div 6} = \frac{3}{4}$$

Both ratios equal $\frac{3}{4}$, so they are equivalent.

Math Talk **Mathematical Practices**

How does knowing how to simplify fractions help you decide whether two ratios are equivalent?

Are the ratios 3:5 and 12:20 equivalent?

1a. Write both ratios as fractions.

1b. Are both ratios in simplest form?

_____

_____

1c. Write both ratios in simplest form.

1d. Are the ratios equivalent?

_____

_____

Write *equivalent* or *not equivalent*.

2. 1 to 3 and 2 to 6

3. 3 to 7 and 12 to 21

_____

_____

On Your Own

Write the equivalent ratio.

4. 5 to 2 = _____ to 4

5. 3 to 6 = 7 to _____

6. 7:2 = _____ :6

7. 14 to 21 = _____ to 15

8. 6:10 = _____ :30

9. 8 to 9 = 40 to _____

Write *equivalent* or *not equivalent*.

10. 3:5 and 21:35

11. 4 to 3 and 36 to 24

12. 27:72 and 9:24

_____

_____

_____

Problem Solving Real World

13. Three of every 5 pizzas that Miggy's Pizza sells are cheese pizzas. Miggy's sold 80 pizzas today. How many of them would you expect were cheese?

_____

Name _____

Rates

Essential Question How can you find rates and unit rates?

⚿ Unlock the Problem (Real World)

CONNECT You know how to write ratios to compare two quantities. A **rate** is a ratio that compares two quantities that have different units of measure. A **unit rate** is a rate that has 1 unit as its second term.

Rafael is shopping at a used book and music store. A sign advertises 4 CDs for $12. What is the unit rate for the cost of 1 CD?

🔑 **Write the rate in fraction form. Then find the unit rate.**

STEP 1

Write the rate in fraction form to compare dollars to CDs.

$\dfrac{\text{dollars} \longrightarrow}{\text{CDs} \longrightarrow} \quad \dfrac{12}{\square}$

STEP 2

Divide to find an equivalent rate so that 1 is the second term.

$$\dfrac{12}{4} = \dfrac{12 \div \square}{4 \div \square} = \dfrac{\square}{1} \longleftarrow \text{unit rate}$$

So, the unit rate for CDs is _____ for 1 CD.

- • What are the units of the quantities that are being compared?

  _____

- • What operations can you use to write equivalent ratios?

  _____

  _____

Math Talk **Mathematical Practices**

Would it make sense to compare CDs to dollars to find a unit rate? **Explain.**

- • **What if** the regular price of CDs is 5 for $20? What is the unit rate for CDs at the regular price? **Explain** how you found your answer.

  _____

  _____

  _____

1. Find the unit rate of speed for 120 miles in 2 hours.

$$\frac{\text{miles}}{\text{hours}} \frac{120}{\boxed{}} = \frac{\boxed{} \div 2}{2 \div \boxed{}} = \frac{\boxed{}}{\boxed{}}$$

The unit rate of speed is _____ per _____ .

Find the unit rate.

2. $5.00 for 2 T-shirts

3. 200 words in 4 min

4. 150 mi on 10 gal of gas

_____

_____

_____

Write the rate in fraction form.

5. 90 words in 2 min

6. $1.20 for 6 goldfish

7. $0.05 per page

_____

_____

_____

Find the unit rate.

8. $208 for 4 tires

9. 300 mi per 15 gal

10. 240 people per 2 sq mi

_____

_____

_____

11. An ice skating rink charges $1.50 to rent ice skates for 30 minutes.
What is the unit rate per hour for renting ice skates?

_____

Name _____

Distance, Rate, and Time

Essential Question How can you solve problems involving distance, rate, and time?

🔑 Unlock the Problem (Real World)

You can use the formula $d = r \times t$ to solve problems involving distance, rate, and time. In the formula, d represents distance, r represents rate, and t represents time. The rate is usually a unit rate comparing distance to time, such as miles per hour.

- What word is used in place of rate?

  _____

- What are the given values?

  _____

- What is the unknown value?

  _____

🔓 Example 1

The winner of an automobile race drove 500 miles at an average speed of 150 miles per hour. How long did it take the winner to finish the race?

STEP 1

Write the formula.

$d = r \times t$

STEP 2

Replace d with 500 and r with 150.

$d = r \times t$

$500 = \boxed{} \times t$

STEP 3

Use what you know about inverse operations to find t.

$500 \div \boxed{} = t$

$3\frac{1}{3} = t$

So, it takes the winner _____ hours or _____ hours _____ minutes to complete the race.

🔓 Example 2

A race car driver traveled at an average speed of 120 miles per hour to finish a race in 2 hours. What was the length of the race?

STEP 1

Write the formula.

$d = r \times t$

STEP 2

Replace r with 120 and t with 2.

$d = r \times t$

$d = \boxed{} \times \boxed{}$

STEP 3

Multiply to solve for d.

$d = 120 \times 2$

$d = \boxed{}$

So, the race was _____ miles long.

Math Talk

Mathematical Practices

Why were different operations used in Step 3 of Examples 1 and 2?

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1. A cyclist travels 45 miles in 3 hours. What is the cyclist's speed?

Write the formula: $d = \boxed{} \times \boxed{}$

Replace d with _____.

Replace t with _____.

The rate is _____ miles per hour.

Use the formula $d = r \times t$ to solve. Include the units in your answer.

2. A train travels at an average speed of 80 miles per hour for 5 hours. How far does the train travel?

3. A horse travels at an average speed of 12 miles per hour. How long does it take the horse to travel 60 miles?

On Your Own

Use the formula $d = r \times t$ to solve. Include the unit in your answer.

4. A hiker travels at a speed of 3 miles per hour for 3 hours. How far does the hiker travel in that time?

5. A snail travels at a speed of 2 centimeters per minute. How long does the snail take to travel 30 centimeters?

6. A boat travels 6 miles in 24 minutes. What is the average speed of the boat?

7. $d = 320$ cm

$r = $ _____

$t = 8$ sec

8. $d = $ _____

$r = 50$ km per hr

$t = 6$ hr

9. $d = 150$ ft

$r = 20$ ft per min

$t = $ _____

_____

Problem Solving *Real World*

10. In an experiment, Ava found that it took a ball 5 seconds to roll down an 80-foot ramp. What is the average speed of the ball?

11. Jason's family is driving 1,375 miles to Grand Canyon National Park. They plan to drive at an average speed of 55 miles per hour. How long will they be driving to reach the park?

Name _____

✓ Checkpoint

Draw a model to find the quotient. Write the quotient in simplest form.

1. $\frac{3}{4} \div 3$

2. $\frac{2}{3} \div 5$

3. $\frac{3}{7} \div 2$

_____ _____ _____

For 4—6, use the drawing to write the ratio.

4. squares to triangles

5. total to dark

6. triangles to total

_____ _____ _____
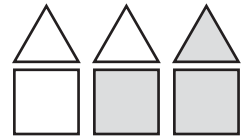
Write the equivalent ratio.

7. 8 to 3 = _____ to 12

8. 2 to 6 = 4 to _____

9. 11:4 = _____ :16

Find the unit rate. (pp. P243–P244)

10. 45 visitors with 5 tour guides

11. 450 mi on 15 gal of gas

12. $56 in 8 hr

_____ _____ _____

Use the formula $d = r \times t$ to solve the problem. Include the units in your answer.

13. $d = $ _____

  $r = 40$ km per hr

  $t = 3$ hr

14. $d = 90$ ft

  $r = 10$ ft per sec

  $t = $ _____

15. $d = 300$ mi

  $r = $ _____

  $t = 4$ hr

Problem Solving Real World

Use the table for 16–17.

16. Fuel efficiency can be written as a rate comparing the distance driven to the gallons of gas used. What is the fuel efficiency of Car A written as a unit rate?

_____

17. During the test, Car B was driven at the speed of 48 miles per hour. How long did the test take?

_____

Fuel Test Results		
Car	Distance (in mi)	Gas (in gal)
A	308	14
B	288	12

Fill in the bubble completely to show your answer.

18. To make fruit punch for a party, Alison used 3 quarts of pineapple juice and 2 gallons of orange juice. There are 4 quarts in a gallon. What is the ratio of pineapple to orange juice in quarts?

(A) 3 to 2

(B) 3 to 5

(C) 3 to 8

(D) 8 to 3

19. Three out of every 10 pairs of skis sold by Snow Sports are cross-country skis. Snow Sports sold 450 pairs of skis during the winter season. How many of the skis were likely to have been cross-country skis?

(A) 443

(B) 135

(C) 45

(D) 30

20. At Greentree Elementary School, there are 72 fifth graders in 3 classrooms. What unit rate describes this situation?

(A) $14\frac{2}{5}$ fifth graders per class

(B) 18 fifth graders per class

(C) 24 fifth graders per class

(D) 216 fifth graders per class

21. Eduardo rides his bicycle for 6 hours. What was Eduardo's average speed if he rides a distance of 84 miles? Use the formula $d = r \times t$.

(A) 504 mi per hr

(B) 90 mi per hr

(C) 78 mi per hr

(D) 14 mi per hr

Name _____

Understand Integers

Essential Question How can you use positive and negative numbers to represent real world quantities?

🔑 Unlock the Problem (Real World)

Connect You have used a number line to show 0 and whole numbers. You can extend the number line to the left of 0 to show the **opposites** of the whole numbers. For example, the opposite of $^+3$ is $^-3$. Any whole number or the opposite of a whole number is called an **integer**.

- How can you tell whether a number is an integer or not?

  _____

  _____

  _____

negative integers ⟵|⟶ positive integers

$^-4$ $^-3$ $^-2$ $^-1$ 0 $^+1$ $^+2$ $^+3$ $^+4$
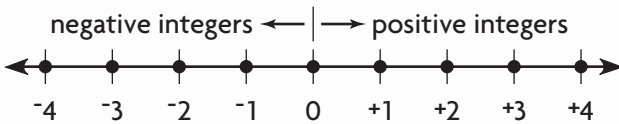
Negative integers are written with a negative sign, $^-$. Positive integers are written with or without a positive sign, $^+$.

🔑 Example 1

The temperature in Fairbanks, Alaska, was 37 degrees below zero. Write an integer to represent the situation.

STEP 1 Decide whether the integer is positive or negative.

The word _____ tells me that the integer is _____.

_____

STEP 2 Write the integer: _____.

So, the temperature in Fairbanks was _____ degrees.

🔑 Example 2

The Koala Bears gained 11 yards on a football play. Write an integer to represent the situation. Then, tell what 0 represents in that situation.

STEP 1 Decide what positive integers and negative integers represent.

Positive integers represent yards _____.

Negative integers represent yards _____.

_____

STEP 2 Decide what 0 represents.

So, 0 means yards were neither _____

nor _____.

Math Talk **Mathematical Practices**

Identify some words that might tell you that an integer is negative.

Share and Show

MATH BOARD

Write an integer to represent the situation.

1. a loss of $25

The word *loss* represents an integer that is

_____.

The integer that represents the situation

is _____.

2. 73 degrees above zero _____

3. 200 feet below sea level _____

4. a profit of $76 _____

Write an integer to represent the situation. Then, tell what 0 represents.

Situation	Integer	What Does 0 Represent?
5. The passenger jet flew at an altitude of 34,000 feet.		
6. Zack lost 45 points on his first turn.		
7. Craig was 20 minutes early for his appointment.		

On Your Own

Write an integer to represent the situation.

8. the temperature went up 2 degrees _____

9. 11 feet below sea level _____

10. an increase of 37 students _____

11. 15 seconds before rocket liftoff _____

Write an integer to represent the situation. Then, tell what 0 represents.

Situation	Integer	What Does 0 Represent?
12. Amelia earned $1,200 in one week.		
13. The coal was 2 miles below ground level.		
14. The alarm clock rang 5 minutes early.		

Problem Solving Real World

15. Gina withdrew $600 from her checking account to pay for her new guitar. What integer can you write to represent the withdrawal? What does 0 represent?

_____

Name _____

Write and Evaluate Expressions

Essential Question How can you write and evaluate expressions?

🔑 Unlock the Problem (Real World)

Montel hires Shea to buy some tools for him at the hardware store. Montel will pay Shea $5 more than the cost of the tools she buys.

A. How can you represent this payment as an expression?

B. How can you use the expression to calculate what Montel will pay Shea?

🔓 **Write an expression for what Montel will pay.**

STEP 1 Choose a variable and explain what it stands for.

Let c equal the cost of the tools.

STEP 2 Write a word expression.

$5 more than the cost.

STEP 3 Replace the word expression with an addition expression using c.

$5 + c$
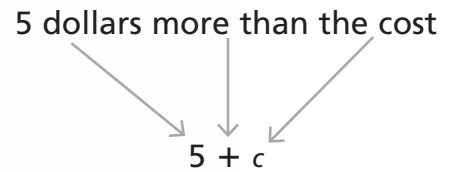
So, an expression that tells how much Montel owes Shea is

$\underline{5 + c}$.

- The problem states that Montel will pay $5 *more than cost*. What operation do the words *more than* suggest?

_____

5 dollars more than the cost

$5 + c$

Try This! **If the tools cost a total of $18, how much will Montel pay Shea?**
Evaluate the expression $5 + c$ for $c = 18$.

STEP 1 Write the expression. _____

STEP 2 Replace c with _____. $5 +$ _____

STEP 3 Add to evaluate. $5 + 18 =$ _____

So, Montel will pay Shea _____.

Math Talk

Mathematical Practices

What key words might tell you that you need to use addition in a word problem?

Getting Ready for Grade 6   GR29

Share and Show

Write an expression.

Tallahassee's temperature is 15 degrees less than the temperature in Miami.

1a. What operation does the phrase *less than* suggest?

_____

1b. Write a word expression:

_____

1c. Write an expression for Tallahassee's temperature. Let m stand for the temperature in Miami.

_____

1d. Evaluate the expression for Tallahassee's temperature for $m = 90$.

_____

Evaluate each expression for the value given.

2. $b - 45$ for $b = 70$

_____

3. $13 + a$ for $a = 40$

_____

On Your Own

Write an expression.

4. Zeke has some tropical fish, f. Dean gave Zeke 5 new fish. How many fish does Zeke have now?

_____

5. Myra had some candles, c. She used up 12 of them. How many candles does Myra have now?

_____

Evaluate each expression for the value given.

6. $s - 18$ for $s = 80$

_____

7. $49 + k$ for $k = 31$

_____

8. $w \times 6$ for $w = 13$

_____

9. $60 \div n$ for $n = 20$

_____

10. $t \times 12$ for $t = 8$

_____

11. $r - 25$ for $r = 110$

_____

Problem Solving Real World

12. Keith is 2 inches shorter than his sister. If s represents his sister's height, what expression can you write that represents Keith's height?

_____

Name _____

Understand Inequalities

Essential Question How can you use inequalities to solve problems?

🔑 Unlock the Problem (Real World)

Every morning, Bobbi's Hot Bagels makes a special claim. All bagels Bobbi's sells will be warm and less than 9 minutes old. What **inequality** can you write to represent in whole minutes how old Bobbi's bagels are?

An inequality is a number sentence that compares two unequal quantities and uses the symbols $<$, $>$, $\leq$, or $\geq$.

- What clue words tell you that this problem involves an inequality?

  _____

🔑 **Write an inequality using a variable.**

STEP 1 Write the inequality in words.

time $\longrightarrow$ is less than $\longrightarrow$ 9

STEP 2 Replace *time* with the variable *t*.

$t \longrightarrow$ less than $\longrightarrow$ 9

STEP 3 Replace the words *less than* with a *less than* ($<$) symbol.

$t < 9$

Try This! Graph the solutions on the number line. Of 3, 6, 9, and 12, which numbers are solutions for $t < 9$?

STEP 1 In $t < 9$, replace t with 3.
Repeat the process for $t = 6, 9, 12$.

$t < 9$
$3 < 9 \longleftarrow$ true

STEP 2 Identify the values that make $t < 9$ true.
True values are solutions: $t = 3, 6$.
False values are not solutions: $t \neq 9, 12$.
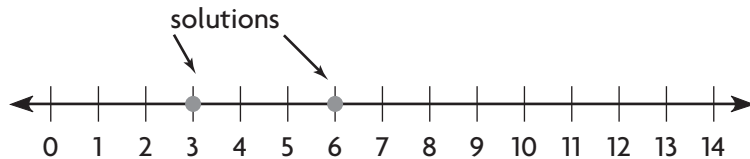
$6 < 9 \longleftarrow$ true
$9 < 9 \longleftarrow$ false
$12 < 9 \longleftarrow$ false

STEP 3 Graph the solutions on a number line.
Graph true values with filled circles.

solutions

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

Math Talk — **Mathematical Practices**

How does the answer for the problem change if the inequality is "*t* is less than or equal to 9"?

Of 2, 5, and 8, which numbers are solutions for the inequality $x \geq 5$?
Graph the solutions on the number line.

1a. Replace x with 2. True or false?

_____

$\longleftarrow \quad | \quad | \quad | \quad | \quad | \quad | \quad | \quad | \quad | \quad | \quad | \quad | \longrightarrow$
    0   1   2   3   4   5   6   7   8   9   10 11

1b. Replace x with 5. True or false?

_____

1c. Replace x with 8. True or false?

_____

Show two solutions for the inequality on a number line.

2. $a < 6$

_____

$\longleftarrow \quad | \quad | \quad | \quad | \quad | \quad | \quad | \quad | \quad | \quad | \quad | \quad | \longrightarrow$
    0   1   2   3   4   5   6   7   8   9   10 11

Of 7, 10, and 13, which numbers are solutions for the inequality?

3. $m > 8$

_____

4. $b \leq 10$

_____

5. $c < 15$

_____

Of 0, 4, 6, and 11, which numbers are solutions for the inequality?

6. $d \geq 8$

_____

7. $r < 1$

_____

8. $s > 4$

_____

Show two solutions for the inequality on a number line.

9. $n \leq 6$

$\longleftarrow \quad | \quad | \quad | \quad | \quad | \quad | \quad | \quad | \quad | \quad | \quad | \quad | \longrightarrow$
    0   1   2   3   4   5   6   7   8   9   10 11

10. $x > 2$

$\longleftarrow \quad | \quad | \quad | \quad | \quad | \quad | \quad | \quad | \quad | \quad | \quad | \quad | \longrightarrow$
    0   1   2   3   4   5   6   7   8   9   10 11

11. For her birthday party, Dina wants to invite at least 8 guests but not
more than 12 guests. How many guests might she have? Name all of the
possibilities.

_____

Name _____

✓ Checkpoint

Concepts and Skills

Write an integer to represent the situation.

1. a shark 125 feet below sea level _____

2. a bank deposit of 300 dollars _____

Write an integer to represent the situation. Then, tell what 0 represents.

Situation	Integer	What Does 0 Represent?
3. a gain of 13 yards by a football team	_____	
4. a temperature of 25 degrees below zero	_____	

Write an expression. Then evaluate the expression for the value given.

5. Miki has n dollars. Dora has 3 more dollars than Miki. How many dollars does Dora have? Evaluate for $n = 14$.

6. Chip has s shells. Gina has 4 times as many shells as Chip. How many shells does Gina have? Evaluate for $s = 6$.

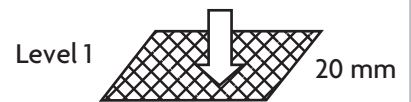**Of 1, 3, 4, and 8, which numbers are solutions for the inequality?**

7. $a < 7$

8. $b \geq 3$

9. $c > 4$

10. $d \leq 8$

Problem Solving Real World

Filters are set up to sort pennies, dimes, and nickels. A penny is 19 mm wide, a dime is 17.9 mm wide, and a nickel is 21 mm wide. Coins less than 20 mm wide will pass through the first level, and coins less than 18.5 mm wide will pass through the second level.

11. If you drop a large number of all 3 coins from above, which coins will be caught at Level 1? Which coins will pass through?

_____

12. Which coins will be caught at Level 2? Which coins will

pass through? _____

drop coins

Level 1 ... 20 mm

Level 2 ... 18.5 mm

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Fill in the bubble completely to show your answer.

13. The lowest temperature ever recorded in North Dakota was 60 degrees below zero Fahrenheit. Which integer represents the temperature?

(A) 0

(B) 60

(C) ⁻60

(D) ⁻0

14. In football, a team receives 3 points for each field goal it makes. Which expression shows the number of points a team will receive for making f field goals?

(A) $3 + f$

(B) $3 \times f$

(C) $f - 3$

(D) $f \div 3$

15. The elevation of Central City is 84 feet above sea level. Which integer is the opposite of 84?

(A) 48

(B) ⁺84

(C) ⁻48

(D) ⁻84

16. Uncle Louie is at least 1 inch shorter than Miriam, and at least 2 inches taller than Jeffrey. Jeffrey's height is 64 inches. Miriam is not more than 5 inches taller than than Jeffrey. Which answer choice could be Uncle Louie's height?

(A) 65 inches

(B) 67 inches

(C) 69 inches

(D) 70 inches

Polygons on a Coordinate Grid

Essential Question How can you plot polygons on a coordinate grid?

Connect You have learned to plot points on a coordinate grid. You can use that skill to plot polygons on a coordinate grid.

🔑 Unlock the Problem (Real World)

Camille is designing an indoor greenhouse on a coordinate grid. The floor of the greenhouse is a polygon. The vertices of the polygon can be graphed using the coordinates shown in the table. Plot and describe the floor of the greenhouse.

x	y
10	1
2	6
2	1
6	10
10	6

- What do *x* and *y* represent in the table?

  _____

  _____

  _____

🔑 **Plot the polygon on a coordinate grid.**

STEP 1 Write ordered pairs.

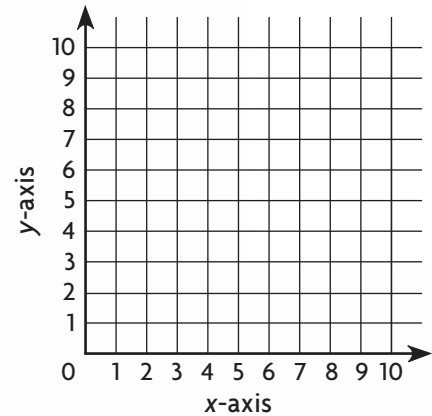Use each row of the table to write an ordered pair.

(10, 1), (2, _____), (_____ , _____),

(_____ , _____), (_____ , _____).

STEP 2 Graph a point for each pair on the coordinate grid.

STEP 3 Connect the points.

So, the floor of the greenhouse is a _____.

- **What if** the greenhouse floor had only four of the five vertices given in the table and did not include (6, 10). What would the shape of the floor be? _____

- A parallelogram on a coordinate grid has vertices at (3, 4), (6, 1), and (8, 4). What are the coordinates of the fourth vertex? **Explain** how you found the answer.

_____

_____

_____
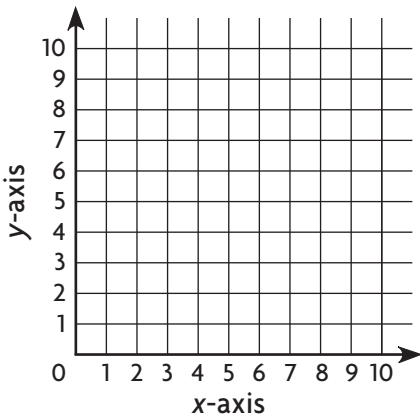
_____

_____

Math Talk

Mathematical Practices

Suppose you know the vertices of a polygon. How can you identify what type of polygon it is without plotting the vertices on a coordinate grid?
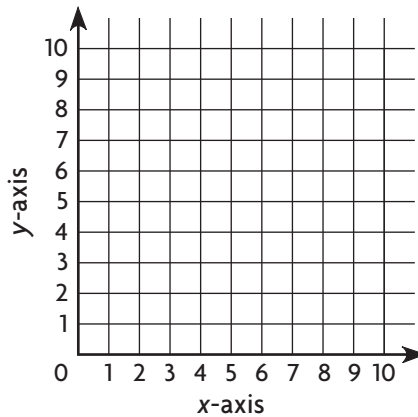
Plot the polygon with the given vertices on a coordinate grid.
Identify the polygon.

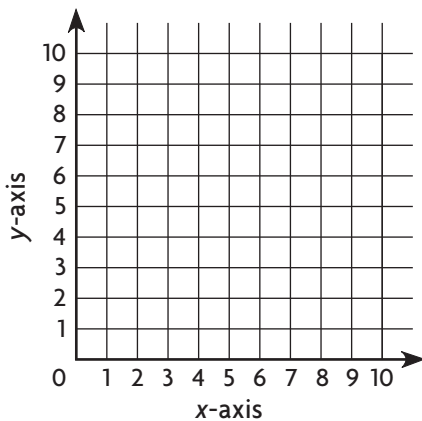**1.** (9, 6), (1, 7), (3, 1)

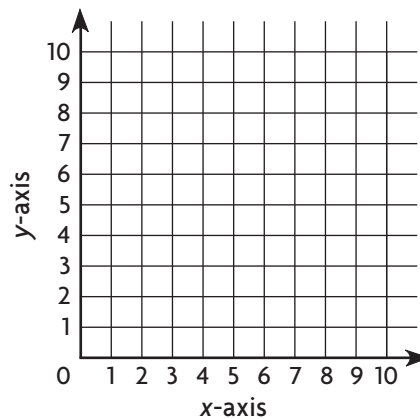**2.** (1, 6), (8, 4), (1, 4), (8, 6)

On Your Own

Plot the polygon with the given vertices on a coordinate grid.
Identify the polygon.

3. (2, 10), (10, 2), (10, 10), (2, 2)

4. (10, 4), (2, 10), (3, 1), (8, 0), (7, 10), (1, 7)


Problem Solving *Real World*

5. A football field is a rectangle measuring 300 ft by 160 ft. Each unit on a
coordinate grid represents 1 foot. (0, 0) and (0, 160) are two of the coordinates of
a football field drawn on the grid. What are the coordinates
of the other two vertices?

Name _____

Area of a Parallelogram

Essential Question How can you find the area of a parallelogram?

Connect You have learned that the area of a rectangle with base *b* and height *h* is $A = b \times h$. The rectangle shown has a base of 5 units and a height of 3 units. So, its area is $A = 5 \times 3 = 15$ square units. You can use what you have learned about the area of a rectangle to find the area of a parallelogram.
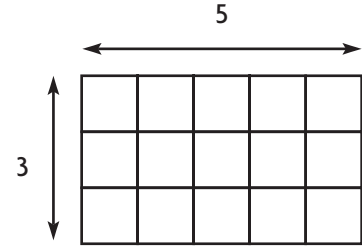
🔑 Unlock the Problem (Real World)

The souvenir stand at Mighty Grasshopper basketball games sells parallelogram-shaped pennants. Each pennant has a base of 12 inches and a height of 5 inches.

Activity   Find the area of the parallelogram.

Materials ▪ grid paper ▪ scissors

STEP 1 Draw the parallelogram on grid paper and cut it out.

STEP 2 Cut along the dashed line to remove a right triangle.

STEP 3 Move the right triangle to the right side of the parallelogram to form a rectangle.
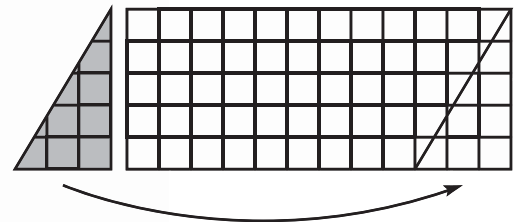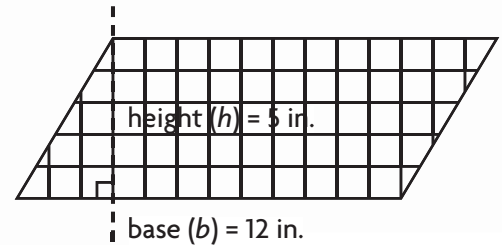
STEP 4 The base of the rectangle measures _____ inches.

The height of the rectangle measures _____ inches.

The area of the rectangle is

$12 \times$ _____ = _____ square inches.

- **Explain** why the area of the parallelogram must equal the area of the rectangle.

_____

So, the area of a pennant is

_____ × _____ = _____ square inches.

Math Talk

Mathematical Practices

Explain how to find the area of a parallelogram if you know the base and the height of the figure.
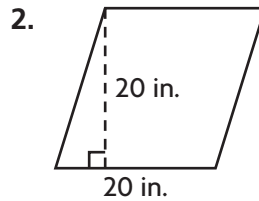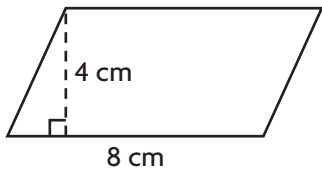
Find the area of the parallelogram.

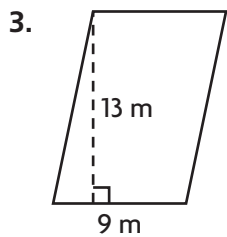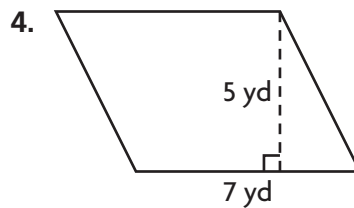**1.** $A = b \times h$

$A = 8 \times 4$

4 cm

8 cm

$A =$ _____ sq cm

2.

20 in.

20 in.

$A =$ _____ sq in.

3.

13 m

9 m

$A =$ _____ sq m

4.

5 yd

7 yd

$A =$ _____ sq yd

On Your Own

Find the area of the parallelogram.

5.

18 in.

32 in.

$A =$ _____ sq in.

6.

2.5 cm

11.3 cm
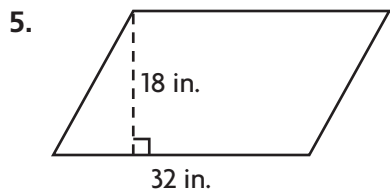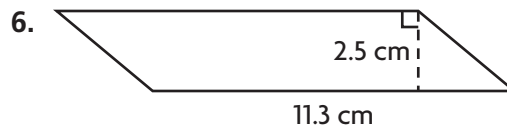
$A =$ _____ sq cm

7. base = 0.6 cm

height = 0.15 cm

$A =$ _____ sq cm

8. base = 1.8 m

height = 2.9 m

$A =$ _____ sq m

9. base = $\frac{1}{2}$ft

height = $\frac{3}{8}$ft

$A =$ _____ sq ft

10. base = $4\frac{1}{4}$in.

height = 20 in.

$A =$ _____ sq in.

Problem Solving Real World

11. Carla made a border for her garden using parallelogram-shaped tiles. Each piece had a base of 4 in. and a height of $2\frac{1}{2}$ in. She used 85 tiles. What was the total area of the border?

_____

Name _____

Median and Mode

Essential Question How can you describe a set of data using median and mode?

The **median** of a set of data is the middle value when the data are written in order. For example, a baseball team scored 6, 2, 6, 0, and 3 runs in five games. The median is 3 runs: 0, 2, ⃝3, 6, 6.

If there is an even number of data items, the median is the sum of the two middle items divided by 2.

The **mode** of a data set is the data value or values that occur most often. A data set may have no mode, one mode, or several modes. The mode of the data set of baseball runs is 6.

Unlock the Problem (Real World)

For the Science Fair, Ronni grew 9 sweet pea plants under different conditions. Here are the plants' heights, in centimeters: 11, 13, 6, 9, 15, 7, 9, 17, 12.

What are the median and mode of the data?

- How can you find the median if there is an even number of data items?

  _____

Find the median and mode.

STEP 1 Order the heights from least to greatest.

6, 7, ____, ____, ____, ____, ____, ____, ____

STEP 2 Circle the middle value.

So, the median is ____ centimeters.

STEP 3 Identify the data value that occurs most often. ____ occurs two times.

So, the mode is ____ centimeters.

Math Talk — **Mathematical Practices**

Give an example of a data set with two modes.

Try This! Find the median and mode of the numbers: 8, 11, 13, 6, 4, 3.

STEP 1 Order the numbers from least to greatest.

____, ____, ____, ____, ____, 13

STEP 2 There is an even number of data items, so divide the sum of the two middle items by 2. $\frac{6 + \_\_}{2} = \frac{\_\_}{2} = \_\_$

So, the median is = ____.

STEP 3 ____ data value appears more than once.

So, the data set has ____ mode.

Share and Show

MATH BOARD

Find the median and the mode of the data.

1. puppies' weights (pounds): 8, 3, 5, 3, 2, 6, 3

   Order the weights: _____

   The median, or middle value, is _____ pounds

   The mode, or most common value,

   is _____ pounds.

2. numbers of students in math classes:
   25, 21, 22, 18, 23, 24, 25

   median: _____ students

   mode: _____ students

3. numbers of 3-point baskets made:
   2, 0, 5, 4, 5, 2, 5, 2

   median: _____ 3-point baskets

   mode: _____ 3-point baskets

4. movie ticket prices ($):
   8, 8, 6, 8, 7, 6, 8, 10, 8, 6

   median: $_____

   mode: $_____

On Your Own

Find the median and the mode of the data.

5. ages of first 10 U.S. presidents
   when inaugurated:
   57, 61, 57, 57, 58, 57, 61, 54, 68, 51

   median: _____ years

   mode: _____ years

6. weights of rock samples (pounds):
   39, 28, 21, 47, 40, 33

   median: _____ pounds

   mode: _____ pounds

7. lengths of humpback whale songs (minutes): 25,
   29, 31, 22, 33, 31, 26, 22

   median: _____ minutes

   mode: _____ minutes

8. Sascha's test scores:
   90, 88, 79, 97, 100, 97, 92, 88, 85, 92

   median: _____

   mode: _____

Problem Solving Real World

9. Adrian recorded the daily high temperatures the first two weeks of July.
   What were the median and mode of her data?

   median: _____ °F

   mode: _____ °F

Daily High Temperatures (°F)						
101	99	98	96	102	101	98
101	98	95	100	102	98	102

Name

Finding the Average

Essential Question How can you find the average of a set of values?

An average of a set of data can be found by finding the sum of the group of numbers from the data and then dividing by the number of addends.

For example, if Anne scores 21 points, 22 points, and 17 points in 3 different basketball games, she scores an average of 20 points per game. This is because $21 + 22 + 17 = 60$, and $60 \div 3$, the total number of points divided by the number of games, is 20.

Unlock the Problem (Real World)

Jonathon and Pilar are practicing to be a juggling team. The table shows the number of seconds they were able to keep 4 balls in the air without making a mistake. What was the average number of seconds they were able to juggle?

Trial	Seconds
a	32
b	8
c	62
d	55
e	13

• How many trials did they record?

_____

Find the average of the times.

STEP 1 Find the sum of the seconds. $32 + 8 + 62 + 55 + 13 = 170$

STEP 2 How many numbers did you add?   5 numbers

STEP 3 Divide the sum by the number of addends. $\frac{34}{5)170}$

So, the average time that Jonathon and Pilar kept 4 balls in the air was __34__ seconds per trial.

Try This! **Find the average of 61, 99, 106, 3, 44, and 89.**

STEP 1 Find the sum.

$61 + 99 + 106 + 3 + 44 + 89 =$ _____

STEP 2 Divide the sum by the number of addends.

$402 \div 6 =$ _____

So, the average of 61, 99, 106, 3, 44, and 89 is _____.

Math Talk **Mathematical Practices**

Use the jugglers' average time per trial. What might you expect of them in their next trial?

Share and Show

MATH BOARD

Tommy's basketball scoring record is shown for this month. What was the average number of points that Tommy scored per game?

1a. Find the sum of the points Tommy scored.

Game	1	2	3	4	5	6	7	8
Points	24	11	31	14	9	21	18	8

1b. How many numbers did you add to find the sum in Exercise 1?

1c. Divide the sum by the number of games. What is the average number of points per game?

Find the average of the set of numbers.

2. 6, 9, 14, 4, 12

3. 44, 55, 33, 22, 40, 40

On Your Own

Find the average of the set of numbers.

4. 4, 8, 12, 14, 15, 19

5. 28, 20, 31, 17

6. 100, 140, 60, 120, 180

7. 17, 91, 49, 73, 115, 27

8. 5, 8, 13, 4, 22, 6, 0, 5, 9

9. 637, 492, 88, 743

10. 2,439; 801; 1,508; 0

11. 13, 12, 11, 13, 15, 13, 19, 22, 13, 19

12. 78, 61, 51, 99, 8, 112, 76, 32, 59

13. Find the average temperature.

Day	1	2	3	4	5	6	7
Temperature (°F)	48	59	38	53	61	61	44

Problem Solving Real World

14. In the temperature table above, suppose the temperature for the next 2 days was 70 degrees. By how much would this change the average temperature over the entire period?

Name _____

Histograms

Essential Question How can you use a histogram to organize data?

🔑 Unlock the Problem (Real World)

🔑 Activity
The table below shows the ages of the members of a bicycle club. Make a **histogram** of the data. A histogram is a bar graph that shows how often data occur in intervals.

Math Idea
In a histogram, the bars touch because they represent continuous intervals.

Ages of Members in a Bicycle Club													
34	38	29	41	40	35	50	20	47	22	19	21	18	17
26	30	41	43	52	45	28	25	39	24	23	25	50	59

STEP 1 Make a frequency table with intervals of 10. Fill in the frequencies.

STEP 2 Choose an appropriate scale and interval for the vertical axis, and list the intervals on the horizontal axis. Label each axis.

STEP 3 Draw a bar for each interval. Give the histogram a title.

Ages	Tally	Frequency
10–19	|||	
20–29	ⅢⅢ ⅢⅢ	
30–39	ⅢⅢ	
40–49	ⅢⅢ|	
50–59	||||	
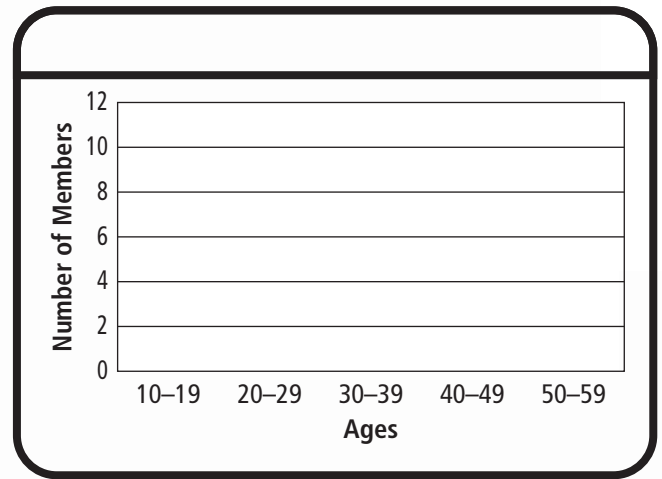
• **What if** you changed the histogram to show four age groups with 12-year intervals?

How would the histogram change?

_____

_____

_____

Math Talk — **Mathematical Practices**

Explain how a histogram and a bar graph with categories are different.

For 1–3, use the data below.

The number of vacation days that each employee of a company took last summer is given below.
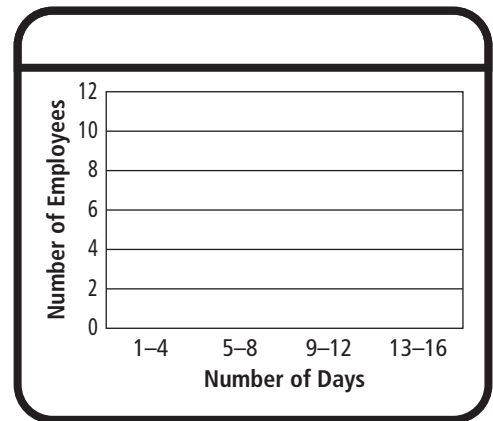
2, 5, 6, 11, 3, 5, 7, 8, 10, 1, 4, 6, 10, 5, 12, 15, 6, 8, 7, 14

1. Start at 1 day and use 4 days for each interval. List the intervals.

2. Complete the frequency table.

Number of Days	Tally	Frequency
1–4	||||	
5–8	ⅢⅡ ⅢⅡ	
9–12	||||	
13–16	||	

3. Complete the histogram.

On Your Own

For 4–6, use the data below.

The number of minutes that each student in Mrs. Green's class spent on homework last night is given below.

45, 30, 55, 35, 50, 48, 60, 38, 47, 56, 40, 39, 55, 65, 49, 34, 35

4. Start at 30 and use 10-minute intervals for the data. List the intervals.

5. Make a frequency table of the data.

6. Make a histogram of the data.

Problem Solving Real World

7. The number of words per minute that one class of students typed is given below.
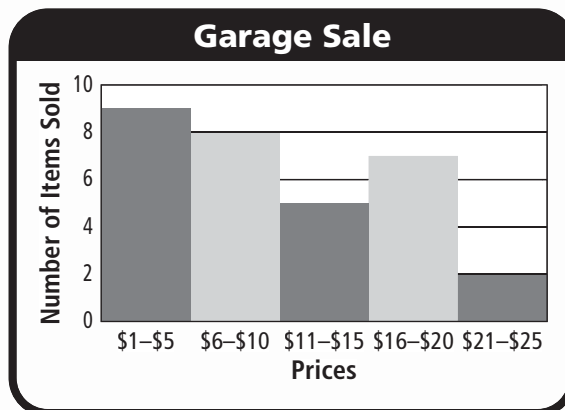
30, 45, 28, 35, 48, 37, 41, 44, 34, 29, 25, 32, 40, 45, 39, 49

What are reasonable intervals for the data?

Name _____

Analyze Histograms

Essential Question How can you analyze data in a histogram?

Unlock the Problem Real World

The histogram shows the number of items sold at a garage sale within each price range.

Garage Sale

ERROR Alert

Remember to read the intervals. For some questions, you may need to combine data from two or more intervals in order to answer the question.

How many of the items sold cost $6 to $10?

• Find the interval labeled $6–$10.

• Find the frequency.

• The bar for $6–$10 shows that _____ items were sold.

So, _____ of the items sold cost $6 to $10.

How many of the items sold cost $16 to $25?

• Find the frequencies for the intervals labeled $16–$20 and $21–$25.

• The bar for $16–$20 shows that _____ items were sold. The bar for $21–$25

  shows that _____ items were sold.

• Add the frequencies.

   7 + _____ + _____

So, _____ of the items sold cost $16 to $25.

Math Talk

Mathematical Practices

Explain why you cannot tell from the histogram the total amount of money that was made during the garage sale.

For 1–3, use the histogram at the right.

1. The histogram shows the number of days in one month whose temperatures were within each temperature range. On how many days was the temperature at or above 70°F?

   • List the bars that represent temperatures at or above 70°F.
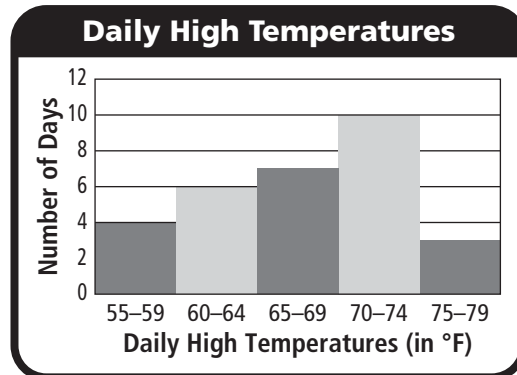
   _____ and _____

   • The frequency for interval 70–74 is _____, and the

   frequency for interval 75–79 is _____.

   • Add the frequencies. _____ + _____ + _____

The daily high temperature was at or above 70°F on _____ days.

2. On how many days was the temperature 65°F to 69°F?

   _____

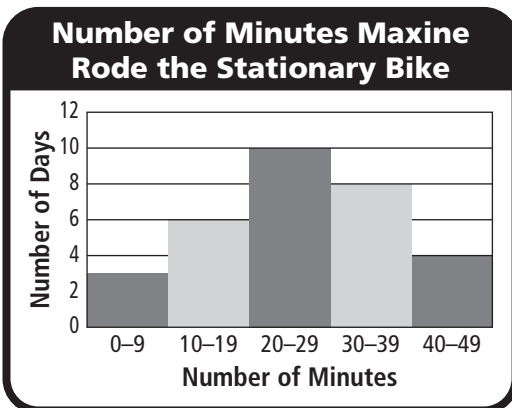3. On how many days was the temperature less than 65°F?

   _____

Daily High Temperatures

Number of Days

12
10
8
6
4
2
0

55–59 60–64 65–69 70–74 75–79
Daily High Temperatures (in °F)

For 4–5, use the histogram at the right.

4. Which interval has the greatest frequency? _____

5. How many days did Maxine ride the stationary bike for 30
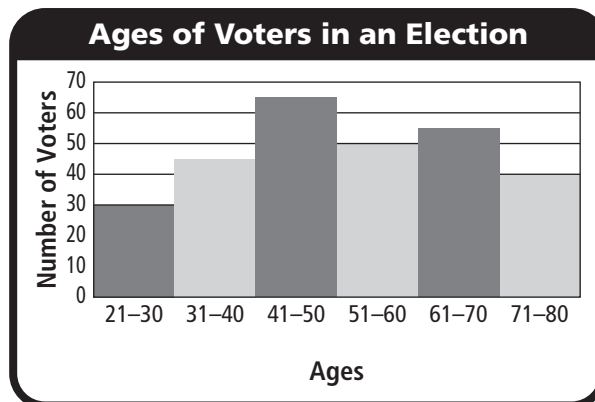
   or more minutes? _____

For 6–7, use the histogram at the right.

6. How many people voted in the election?

   _____

7. How many more voters were there from ages 41–50 than from ages 21–30?

   _____

Number of Minutes Maxine Rode the Stationary Bike

Number of Days

12
10
8
6
4
2
0

0–9 10–19 20–29 30–39 40–49
Number of Minutes

Ages of Voters in an Election

Number of Voters

70
60
50
40
30
20
10
0

21–30 31–40 41–50 51–60 61–70 71–80

Ages

Name _____

✓ Checkpoint

Concepts and Skills

1. Plot and identify the polygon with vertices at (4, 0), (8, 7), (4, 7), and (8, 0).
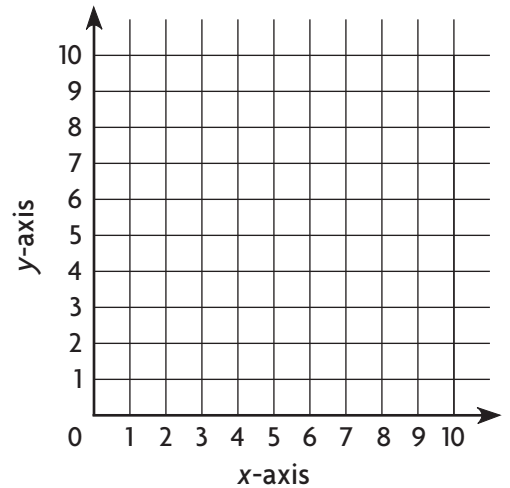
   _____

2. A parallelogram has a base of 8.5 cm and a height of 6 cm. What is the area of the parallelogram?

   _____

3. Find the median and mode of Erin's math sores: 93, 88, 85, 93, 100, 95, 85, 89.

   median _____ mode _____

4. Find the average of the following temperatures: 59ºF, 66ºF, 59ºF, 67ºF, 54ºF, 64ºF, 72ºF.

   average _____

For 5–7, use the data below.

The math test scores for Miss Jackson's class are given below.

88, 94, 86, 78, 65, 83, 71, 74, 92, 73,
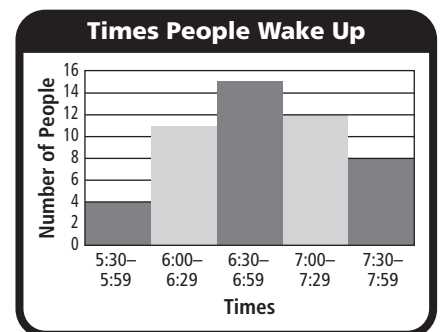95, 71, 100, 98, 68, 85, 81, 93, 89, 84

5. Make a histogram for the data using intervals of 10.

6. Which interval has the greatest frequency?

   _____

7. How many students received grades greater than 80? _____

Problem Solving Real World

For 8–9, use the histogram. The histogram shows the times that people wake up in the morning.

8. How many people were surveyed? _____

9. How many more people surveyed wake up between 6:30 and 6:59 than between 7:30 and 7:59?

   _____

Times People Wake Up

(histogram with y-axis "Number of People" labeled 0 to 16 by 2, x-axis "Times" with intervals 5:30–5:59, 6:00–6:29, 6:30–6:59, 7:00–7:29, 7:30–7:59)

Fill in the bubble completely to show your answer.

10. On a map of the town of Barton, City Hall Park has three of its four vertices at (15, 0), (5, 0), and (15, 9). City Hall Park is a rectangle. What are the coordinates of the park's fourth vertex?

（A） (5, 9)

（B） (9, 5)

（C） (5, 15)

（D） (9, 15)

11. A window at an art gallery is shaped like a parallelogram. The base measures 1.2 meters and the height measures 0.8 meters. What is the area of the window?

（A） 0.48 sq m

（B） 0.96 sq m

（C） 1.92 sq m

（D） 2.0 sq m

12. The ages of the members of the Chess Club are given below. What is the median age?

13, 9, 10, 9, 14, 13, 8, 9

（A） 9

（B） 9.5

（C） 10

（D） 10.5

13. The histogram shows the ages of runners in a half-marathon. How many runners are between the ages of 21 and 40?

（A） 24

（B） 30

（C） 42

（D） 54

Ages of Half-Marathon Runners